

1           (c) determining base at least in part on the list of frame dependencies whether a  
2 decoded version of the particular frame is in a decoded frame cache, and if it is not and  
3 if the particular frame has a frame dependency:  
4               (i) determining a frame dependency for the particular frame;  
5               (ii) determining which of the frames in the frame dependency are in the  
6 decoded frame cache;  
7               (iii) decoding any frame in the frame dependency that is not in the  
8 decoded frame cache and placing it in the decoded frame cache; and  
9               (iv) using at least one of the decoded frames in the frame dependency to  
10 decode the particular frame to create a decoded version of the particular frame.

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12           2. (Amended) The method of claim 1, wherein the request to playback a  
13 particular frame is part of a request to perform frame-by-frame backward playback and  
14 part (b) is performed for successively earlier frames with respect to the particular frame  
15 as part of the frame-by-frame backward playback.

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17           3. (Unchanged) The method of claim 1, wherein part (i) is performed whether  
18 or not it is determined that a decoded version of a particular frame is in the decoded  
19 frame cache without part (iv) being performed.

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21           4. (Unchanged) The method of claim 1, wherein the particular frame may be  
22 an I, P, or B frame of MPEG compressed video.

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24           5. (Unchanged) The method of claim 1, wherein the frame dependency is an  
25 immediate frame dependency.

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27           6. (Amended) The method of claim 5, wherein the at least some of the  
28 decoded frames referred to in part (a)-(iv) are those frames in the immediate  
29 dependency.

1       7. (Amended) The method of claim 5, wherein part (b<sub>C</sub>) includes recursion  
2 where frames in the immediate frame dependency of the frame of interest are not in the  
3 decoded frame cache.

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5       8. (Amended) The method of claim 1, wherein part (b<sub>C</sub>) includes a loop with  
6 a terminating condition that all frames on which the particular frame is dependent have  
7 been decoded.

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9       9. (Unchanged) The method of claim 1, wherein decoded frames are  
10 replaced in the decoded frame cache according to a least recently used policy.

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12       10. (Unchanged) The method of claim 1, wherein an index is used to  
13 represent each frame in the frame dependency.

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15       11. (Unchanged) The method of claim 1, wherein the frame dependency is  
16 determined through a look-up table.

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18       12. (Unchanged) The method of claim 11, wherein the frame dependency is  
19 determined through successive uses of a look-up table.

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21       13. (Unchanged) The method of claim 1, wherein the decoded frame cache  
22 includes a data structure.

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24       14. (Unchanged) The method of claim 1, wherein the decoded frame cache  
25 includes a section of main memory.

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27       15. (Amended) An article comprising:  
28           a computer readable medium having instructions thereon which when executed  
29 cause a computer to:  
30           (a) detect a request to randomly access playback a particular frame; and

1           (b) maintaining a list of frame dependencies identifying at least a set of frames  
2 required to decode the particular frame;

3           (c) determine base at least in part on the list of frame dependencies whether a  
4 decoded version of the particular frame is in a decoded frame cache, and if it is not and  
5 if the particular frame has a frame dependency:

- 6                 (i) determine a frame dependency for the particular frame;  
7                 (ii) determine which of the frames in the frame dependency are in the  
8 decoded frame cache;  
9                 (iii) decode any frame in the frame dependency that is not in the decoded  
10 frame cache and place it in the decoded frame cache; and  
11                 (iv) use at least one of the decoded frames in the frame dependency to  
12 decode the particular frame to create a decoded version of the particular frame.

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14           16. (Amended) The article of claim 15, wherein the request to playback a  
15 particular frame is part of a request to perform frame-by-frame backward playback and  
16 part (b) is performed for successively earlier frames with respect to the particular frame  
17 as part of the frame-by-frame backward playback.

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19           17. (Unchanged) The article of claim 15, wherein part (i) is performed whether  
20 or not it is determined that a decoded version of a particular frame is in the decoded  
21 frame cache without part (iv) being performed.

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23           18. (Unchanged) The article of claim 15, wherein the frame dependency is an  
24 immediate frame dependency.

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26           19. (Amended) The article of claim 18, wherein the at least some of the  
27 decoded frames referred to in part (a)-(iv) are those frames in the immediate  
28 dependency.

1        20. (Amended) The article of claim 18, wherein part (bc) includes recursion  
2 where frames in the immediate frame dependency of the frame of interest are not in the  
3 decoded frame cache.

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5        21. (Amended) The article of claim 15, wherein part (bc) includes a loop with  
6 a terminating condition that all frames on which the particular frame is dependent have  
7 been decoded.

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9        22. (Unchanged) The article of claim 15, wherein decoded frames are  
10 replaced in the decoded frame cache according to a least recently used policy.

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12        23. (Unchanged) The article of claim 15, wherein an index is used to represent  
13 each frame in the frame dependency.

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15        24. (Unchanged) The article of claim 15, wherein the frame dependency is  
16 determined through a look-up table.

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18        25. (Unchanged) The article of claim 24, wherein the frame dependency is  
19 determined through successive uses of a look-up table.

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21        26. (Amended) A computer system including:  
22            a processor and video processing circuitry;  
23            a display; and  
24            memory including instructions which when executed cause the processor and  
25            video processing circuitry to:

26            (a) detect a request to randomly access playback a particular frame; and  
27            (b) maintain a list of frame dependencies identifying at least a set of frames  
28            required to decode the particular frame;

29            (c) determine whether a decoded version of the particular frame is in a decoded  
30 frame cache, and if it is not and if the particular frame has a frame dependency:

31              (i) determine a frame dependency for the particular frame;

1                         (ii) determine which of the frames in the frame dependency are in the  
2 decoded frame cache;  
3                         (iii) decode any frame in the frame dependency that is not in the decoded  
4 frame cache and place it in the decoded frame cache; and  
5                         (iv) use at least one of the decoded frames in the frame dependency to  
6 decode the particular frame to create a decoded version of the particular frame.  
7                         (ed) provide the decoded version of the particular frame for displaying on the  
8 display.

9

10                 27. (Amended) A method for randomly accessing a first frame of a video  
11 stream, comprising:

12                         maintaining a list of frame dependencies identifying at least a set of frames  
13 required to decode the first frame;  
14                         determining a decoding of the first frame is not in a decoded frame cache;  
15                         determining, based at least in part on the list of frame dependencies, a first frame  
16 dependency for the first frame comprising frames required to decode the first frame;  
17                         decoding at least one of the frames of the frame dependency not present in the  
18 decoded frame cache, and placing it in the decoded frame cache; and  
19                         decoding the first frame using at least one of the decoded frames in the decoded  
20 frame cache.

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22                 28. (Unchanged) The method of claim 27, further comprising:  
23                         decoding each frame of the frame dependency not present in the decoded frame  
24 cache, and placing them in the decoded frame cache.

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26                 29. (Unchanged) The method of claim 27, further comprising:  
27                         recursively decoding the second frame of the frame dependency.

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29                 30. (Unchanged) A method according to claim 27 for reverse playback of  
30 frames of the video stream, comprising:

1       determining a second frame is not in the decoded frame cache, the second frame  
2 following the first frame in the video stream;  
3       determining a second frame dependency for the second frame comprising  
4 frames required to decode the second frame;  
5       decoding at least one of the frames of the frame dependency not present in the  
6 decoded frame cache, and placing it in the decoded frame cache; and  
7       decoding the second frame using at least one of the decoded frames in the  
8 decoded frame cache.

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10      31. (Unchanged) The method of claim 30, further comprising:  
11       playing the second frame and then the first frame.

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13      32. (Unchanged) The method of claim 30, wherein the second frame is an  
14 immediately following frame of the first frame.

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16      33. (Amended) An article comprising a machine-accessible media having  
17 associated data for randomly accessing a first frame of a video stream, wherein the  
18 data, when accessed, results in a machine performing:

19       maintaining a list of frame dependencies identifying at least a set of frames  
20       required to decode the first frame:

21       determining a decoding of the first frame is not in a decoded frame cache;  
22       determining, based at least in part on the list of frame dependencies, a first frame  
23 dependency for the first frame comprising frames required to decode the first frame;  
24       decoding at least one of the frames of the frame dependency not present in the  
25 decoded frame cache, and placing it in the decoded frame cache; and  
26       decoding the first frame using at least one of the decoded frames in the decoded  
27 frame cache.

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29      34. (Unchanged) The article of claim 33 wherein the machine-accessible  
30 media further includes data, when accessed, results in the machine performing: